

III. REMARKS

1. Claims 19, 23-26, 35, 41 and 43 are amended. It is noted that the amendments to claims 23-26 are to correct the dependency of the claims and does raise any issues of estoppel.

2. Applicant requests a telephone interview with the Examiner after the Examiner has had a chance to review the amendments and arguments included herein.

3. Claims 19-24, 27-30 and 47 are patentable under 35 U.S.C. 103(a) over Amateau et al. (US 5451275, hereinafter "Amateau") and Cole et al. (US 5711187, hereinafter "Cole"). Claim 19 recites that each die has an outer peripheral powder metal gear tooth finishing surface configured to substantially finish the powder metal surface of each tooth during rolling. This feature is not disclosed or suggested by the combination of Amateau and Cole.

Amateau discloses something different than what is claimed by Applicant. Amateau discloses is that each rolling gear die (44, 46) has an outer peripheral profiled surface for rolling the gear teeth surfaces of the workpiece (42) to a desired outer peripheral profiled shape (Col. 12, L. 64 - Col. 13, L. 2).

Combining Amateau with Cole does not remedy the above noted deficiency. Cole discloses that each rolling die is normally in the form of a mating gear made from hardened tool steel. In use the die is engaged with the sintered gear blank, as the two are rotated their surfaces are brought together to compact and roll the selected areas of the blank surface. When a predetermined axle spacing is reached, rotation at that spacing will usually continue for a given number of gear revolutions. (Col. 2, L. 42-

62; Col. 3, L. 23-42). There are no other features of the rolling dies disclosed in Cole. Cole simply does not disclose or suggest that the resulting gear is a finished gear or that the dies have "an outer peripheral powder metal gear tooth finishing surface configured to substantially finish the powder metal surface of each tooth during rolling". Rather, the gears of Cole are subject to subsequent heat treatment and grinding processes to achieve the finished shape of the gear (See the Affidavit at page 4, item 5 submitted with Applicant's prior response dated September 10, 2007).

Thus, claim 19 is patentable over the combination of Amateau and Cole because neither reference, alone or in combination, discloses or suggests that each die has an outer peripheral powder metal gear tooth finishing surface configured to substantially finish the powder metal surface of each tooth during rolling. Claims 20-24, 27-30 and 47 are patentable over the combination of Amateau and Cole at least by reason of their respective dependencies.

Further, the gears of Applicant's claims have shown unexpected increases in durability over conventional powder metal gears. The surface durability (i.e. pitting fatigue) of conventional powder metal gears (i.e. pressed, sintered, carburized, hardended and tempered) have a pitting fatigue life in the range of 30-40% of that of wrought steel gears (See *Evaluation of Skuffing Resistance of Powder Metal Gears in the FZG Back to Back Rig*, J. Mandel et al., International Conference on Powder Metallurgy and Particulate Materials, part 11, p. 43-57, June 2005, attached hereto; Figure 11 on page 51 shows comparative pitting fatigue data on gears). Conventional powder metal specimens including low density (pressed, sintered, carburized, hardended and

tempered) specimens, specimens that have been selectively surface densified (per the method of Cole) and fully densified specimens (powder forged) have also been subjected to rolling contact fatigue tests. It is noted that the G-50 life at 2500 MPa for wrought steel specimens was about 4-6 million cycles. The surface densified and the fully densified powder metal specimens showed a G-50 life of about 1.7 to 2.8 million cycles (or about 50% of that of wrought steel specimens) (See *Rolling Contact Fatigue Performance of Contrasting Surface Densified, Powder Forged and Wrought Steel Materials*, W. Jandeska et al., International Conference on Powder Metallurgy and Particulate Materials, part 12, p. 44-55, June 2005, attached hereto; Table 1 on page 47 and table 3 on page 53 shows rolling contact fatigue data for cylindrical specimens).

Surface durability tests on the gears recited in Applicant's claims have been conducted at the Applied Research Lab at Pennsylvania State University. These tests compared the pitting fatigue resistance of the ausformed powder metal gears as claimed by Applicant to wrought steel gears and powder metal forged (fully densified) steel gears. Applicant's ausformed powder metal gears showed about a 100% higher pitting fatigue G-50 life as compared to wrought steel gears, and a pitting fatigue G-50 life of over ten times higher than powder metal forged steel gears that had not been ausformed. These exceptional and unexpected increases in performance and durability of the ausformed powder metal gears as claimed by Applicant can be attributed to the enhanced accuracy and surface finish of ausformed powder metal gears, as well as increased strength due to ausforming effects. (See the Declaration dated December 12, 2007, Items 2-4, attached hereto).

Thus, Applicant's claims are also patentable over the combination of Amateau and Cole based on the unexpected increases in performance and durability.

4. Claims 25 and 26 are patentable under 35 U.S.C. 103(a) over Amateau, Cole and "Applicant's Admitted Prior Art". It is submitted that because Amateau and Cole do not disclose or suggest all the features of Applicant's claim 19 (from which claims 25 and 26 depend) that the combination of Amateau, Cole and "Applicant's Admitted Prior Art" cannot as well. Thus claims 25 and 26 are patentable at least by reason of their respective dependencies.

5. Claims 31 and 32 are patentable are patentable under 35 U.S.C. 103(a) over Amateau, Cole and Torii et al. (US 4972735, hereinafter Torii). It is submitted that because Amateau and Cole do not disclose or suggest all the features of Applicant's claim 19 (from which claims 31 and 32 depend) that the combination of Amateau, Cole and Torii cannot as well. Thus claims 25 and 26 are patentable at least by reason of their respective dependencies.

6. Claims 35, 37-39 and 41-46 are patentable under 35 U.S.C. 103(a) over Sonti et al. (US 6779270, hereinafter Sonti) and Cole. Claim 35 recites that the rolling die has an outer peripheral powder metal gear tooth finishing surface configured to substantially finish the powder metal surface of each tooth during rolling. This feature is not disclosed or suggested by the combination of Sonti and Cole.

Sonti discloses something different than what is claimed by Applicant. Sonti discloses that each rolling die has a plurality of teeth (42) and an outer peripheral contoured surface (44)

extending between generally parallel spaced lateral surfaces (46, 48) (Col. 4, L. 48-51).

Cole, as described above, merely discloses that that each rolling die is normally in the form of a mating gear made from hardened tool steel (Col. 2, L. 42-62; Col. 3, L. 23-42). There are no other features of the rolling dies disclosed in Cole. Cole simply does not disclose or suggest that the resulting gear is a finished gear or that the dies have "an outer peripheral powder metal gear tooth finishing surface configured to substantially finish the powder metal surface of each tooth during rolling". Rather, the gears of Cole are subject to subsequent heat treatment and grinding processes to achieve the finished shape of the gear (See the Affidavit at page 4, item 5 submitted with Applicant's prior response dated September 10, 2007).

Thus, claim 35 is patentable over the combination of Sonti and Cole because neither reference, alone or in combination, discloses or suggests that each die has an outer peripheral powder metal gear tooth finishing surface configured to substantially finish the powder metal surface of each tooth during rolling.

Claim 35 is also patentable for the additional reason that the gears of Applicant's claims proved to have unexpected increases in performance and durability as described above with respect to claim 1.

Claims 41 and 43 are patentable over the combination of Amateau and Cole for reasons that are substantially similar to those described above with respect to claim 35. Claims 37-39, 42 and 44-46 are patentable over the combination of Amateau and Cole at least by reason of their respective dependencies.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment for one additional dependent claim and any fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,



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